**Testimony of Sara Porterfield**

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**House Natural Resources Committee's Subcommittee on Water, Oceans, and Wildlife**

**Legislative Hearing on H. Res. 320, H.R. 4832, H.R. 5001, & H.R. 5345**

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Thank you, Chairman Huffman, Ranking Member Bentz, and members of the Subcommittee for inviting me to testify today on behalf of Trout Unlimited (TU) and its over 300,000 members and supporters nationwide. My name is Dr. Sara Porterfield, and I am the Water Policy Associate for TU's Western Water & Habitat Program.

TU's mission is to bring together diverse interests to care for and recover rivers and streams so our children can experience the joy of wild and native trout and salmon. In pursuit of this mission across the West, TU has worked with ranchers, farmers, states, Tribes, federal, state, and local agencies, local contractors, businesses, and many other partners to restore streams while also sustaining working lands and vibrant communities.

Today I am speaking in support of H.R. 4832, the Open Access Evapotranspiration Data Act, and H.R. 5345, the Saline Lakes Ecosystems in the Great Basin States Program Act of 2021.

## 1. H.R. 4832 *Open Access Evapotranspiration Data Act*

TU and many others are appreciative of the work of Representatives Lee, Stewart, and Huffman to authorize OpenET at the U.S. Department of the Interior within the U.S. Geologic Survey (USGS) through H.R. 4832, the Open Access Evapotranspiration Data Act. Before addressing the bill, this testimony will first lay the foundation for what OpenET is, discuss the partners behind OpenET, and highlight a few use cases—projects that have successfully used OpenET data in on-the-ground applications.

Members of this subcommittee are all too familiar with the fact that sustainable water management is one of the most challenging issues of our time–highlighted again in this subcommittee's hearings of October 15th and 20th on Colorado River Drought Conditions and Response Measures. Maximizing the benefits of water supplies requires careful measurement of availability and use; however, there is one important information gap compounding this challenge: the lack of consistent consumptive water use data. Before OpenET, access to this data has been limited and expensive, keeping it out of the hands of most water users and decision-makers. OpenET fills this huge data gap in order to support sustainable water management and innovation in water conservation.

**What is OpenET?**

OpenET has been a public-private collaboration to develop an online platform for mapping evapotranspiration (ET) at the scale of individual fields. OpenET was built to fill an important

data gap in water management, beginning with the western United States. OpenET uses best available science and publicly available data to increase access to satellite-based ET and consumptive water use information for farmers and water managers.

For those who aren't familiar, ET is the process by which water is transferred from the land to the atmosphere. It includes both evaporation from soil and transpiration from plant leaves. ET is a core driver of the Earth's water cycle, returning water to the atmosphere to fall again as precipitation. For irrigated agriculture, ET is a measure of the water used to grow food and is the biggest share of water use in most arid environments around the world. In most agricultural regions, net ET (total ET less precipitation that contributes to ET) is also a measure of consumptive use of water that is diverted or pumped from surface and groundwater supplies. Consumptive water use refers to all of the water within a system that cannot be recovered or reused, and includes water that is consumed by plants or humans, evaporated, or contaminated.

The word "open" in OpenET stands primarily for the *open*, collaborative, and transparent development of the platform. OpenET brought together many of the leading scientists and developers behind satellite-based estimation of ET onto one team. It is also a core objective of OpenET to provide open access to ET data for farmers, practitioners, and water managers alike.

The OpenET collaborative is led by NASA, the Desert Research Institute (DRI), and Environmental Defense Fund (EDF), with in-kind support from Google Earth Engine. The technical team brings expertise in satellite-based estimation of ET, cloud computing, and user-driven website design. It includes approximately 30 researchers and practitioners from NASA, DRI, U.S. Department of Agriculture (USDA) Agricultural Research Service, U.S. Geological Survey (USGS), University of Nebraska, University of Idaho, University of Wisconsin, University of Maryland, California State University Monterey Bay, University of Montana, Google Earth Engine, and web development firm HabitatSeven.

The broader OpenET community includes partnerships with more than 45 stakeholder entities and organizations. This includes growers and agricultural groups making irrigation scheduling and other decisions at the field scale, water district managers building water accounting and trading platforms, and state and federal agencies making drought and water budget assessments at large scales. The insights learned through these partnerships are integral to the success of OpenET, including defining user requirements, providing feedback on the website design, and testing the beta versions of the user interface.

OpenET builds upon decades of investment by NASA, USGS, the National Oceanic and Atmospheric Administration (NOAA), and the European Space Agency (ESA) to develop, launch, and operate a constellation of Earth-observing satellites, and to establish the ground data systems required to capture, process, store, and distribute satellite data. All of the models in the OpenET ensemble leverage data from Landsat satellites to produce field-scale ET estimates, which is the primary satellite dataset used by the OpenET platform. However, multiple models implemented within the OpenET framework also integrate data from other satellites, including GOES, Sentinel-2, Suomi NPP, Terra, and Aqua, to produce ET data at a range of spatial and temporal scales.

**Use Cases**
OpenET has incorporated "use cases" to highlight the impactful ways that more accessible ET data can encourage and support sustainable land and water management and drive more wide-scale adoption of innovative water management solutions. These use cases provide site-specific insights to improve local management and build awareness and engagement within end-user communities. The insights learned through these use cases have been integral to the success of OpenET, including defining user requirements, providing feedback on the website design, and testing the beta versions of the user interface.

To date, the partners who have been working with OpenET on use cases across six states in the West include:

- Navajo Nation (Arizona and New Mexico)
- Salt River Project (Arizona)
- Sacramento-San Joaquin Valley water users (California)
- E. & J. Gallo Winery (California)
- Kremmling ranchers (Colorado)
- Bureau of Reclamation and Upper Colorado River Commission (Colorado)
- Diamond Valley ranchers (Nevada)
- Harney Basin ranchers (Oregon)
- Texas Water Development Board (Texas)
- Rosedale-Rio Bravo Water Storage District (California)

In order to provide some color as to what some of these use cases entail, below are several examples:

<u>Kremmling, Colorado</u>
In Colorado, TU is a partner in a four-year collaborative research project is evaluating the potential water conservation and agronomic viability of temporary and compensated reductions in irrigation on high-altitude irrigated pastures. This project brings together expertise from OpenET, Colorado State University, Utah State University, American Rivers, TU, The Nature Conservancy, the Colorado Water Conservation Board, and ranchers in the Kremmling area. Data from OpenET will help the team compare water savings on fields with reduced irrigation relative to parcels with normal irrigation on over 1,000 acres.

The study will also answer questions about how variations in forage species, soil, and groundwater conditions affect changes in consumptive water use and crop yields when irrigation is decreased. Early provisional data from this project is encouraging, with high correlation between OpenET data and data from on-the-ground measurement equipment that monitors local metrics, including evapotranspiration. Also promising are both anecdotal reports and preliminary data suggesting that previously fallowed fields are recovering well when returned to irrigated conditions. This project provides a real-world laboratory for addressing important questions on measuring and verifying water conservation and the agronomic impacts of reduced irrigation.

<u>Diamond Valley (Nevada)</u>
In Diamond Valley, Nevada over 110,000 tons of alfalfa and grass hay are produced annually from approximately 26,000 acres irrigated with groundwater. Groundwater levels within

Diamond Valley are continually declining, which prompted the Nevada State Engineer's Office to designate the valley as a critical management area. Using OpenET, farmers in Diamond Valley are able to easily access historical and near-real time consumptive use data so that water budgets and required pumping reductions are better understood. OpenET also allows users to track and demonstrate the degree to which changes in irrigation practices have contributed to their water reduction goals and can help growers understand the relationship between pumping and ET. The ability to rapidly assess and share information about the benefits of water conservation measures by the agricultural community is an important strength of OpenET.

Harney County, Oregon

Groundwater level declines in the overallocated Harney Basin in eastern Oregon triggered the Oregon Water Resources Department to designate the basin a groundwater area of concern and close the area to new water permits. A community-based water planning effort will be able to use OpenET data to support the development and operation of innovative approaches to decreasing groundwater use while sustaining the economy and ecosystems of the Harney Basin. Some of the approaches being pursued require reliable and complete water use measurement, reporting and accounting for past, current, and future water use. Currently, however, water-use measurement data in the Harney Basin are limited to a few locations. Basin-wide water-use measurements can only be feasibly and economically achieved through a satellite-based approach. Combined with field boundary data from state and federal agencies, OpenET will quantify past and current water use and inform forecasts of future use. OpenET data will be used to support the community-based effort to bring water supplies and water demand into balance for the basin and to sustain agricultural production for generations to come.

Rosedale Rio-Bravo Water Storage District, California

Rosedale-Rio Bravo Water Storage District serves landowners on nearly 44,000 acres in the critically overdrafted Kern Groundwater Subbasin, which is ground zero for groundwater overdraft in California's Central Valley. Under the California Sustainable Groundwater Management, the region is required to balance its groundwater supply and demand by 2040. To help comply with the law, Rosedale built a groundwater accounting and trading platform using OpenET data. Evapotranspiration data from OpenET lets landowners track their own annual water budget by parcel to inform irrigation and crop management, and helps Rosedale track the water budget for the entire district. The platform, launched in spring 2020, will also serve as the foundation to launch a regional water trading program, which will give farmers more flexibility in managing their water supplies.

**Privacy and OpenET**

Given the partnership's extensive engagement with farmers and ranchers, some have raised concerns about how OpenET data may be used.

OpenET, in fact, "democratizes" data across all water users, data which is derived entirely from publicly available datasets. It is intended to help level the playing field between growers and regulators, who often have very different data about water use. Having access to a common source of estimated ET can help to shape policy making by increasing transparency and providing a means to reach a common understanding of water needs in a particular region. Over time, OpenET may also help to reduce the costs for measuring and reporting water use.

For example, in the Sacramento-San Joaquin Delta use case in California, state law requires landowners to measure and report their water diversion and use. However, compliance has proved challenging because metering devices are expensive to buy, difficult to maintain, and unable to provide reliable data in this region. As a result, Delta regulators and water users have turned to OpenET as the solution: Beginning in January 2022, landowners will use OpenET data to meet their water use measurement requirements, saving them thousands of dollars a year and significantly simplifying the burden of regulatory compliance.

Water management also is inherently local, and resilience is achieved when local communities have the tools and data they need to find their own best paths forward to meet their water management challenges. Access to ET data can empower local communities to find their own best paths to water security and sustainability, and give small farmers, ranchers, and water managers equal access to ET data so they can:

- Better understand water needs and water use to facilitate locally driven water-management efforts;
- Cost-effectively track how changes in irrigation technology or management practices are contributing to water conservation goals, and learn from one another as different approaches are tested within a community; and
- Explore flexible solutions like water trading or incentive-based conservation.

As mentioned earlier, OpenET is already being used in places such as Kremmling and Diamond Valley to help inform and shape locally driven solutions to water challenges. In both regions, the goal is to identify solutions that balance water supply and demand while supporting farmers and sustained agricultural production and vibrant rural economies.

**H.R. 4832**

H.R. 4832 would implement an OpenET Data Program at USGS for delivering satellite-based evapotranspiration data to advance the quantification of evaporative losses and consumptive water use, and to provide data users with field-scale estimates of ET data across large landscapes over certain intervals of time. Specifically, it would authorize up to $14 million per year to:

- Sustain and advance the technology and underlying science for OpenET;
- Coordinate among federal agencies on the incorporation and use of data from OpenET into models, reports, and decision support tools;
- Provide grants to states to help them operationalize the use of OpenET; and
- Support training workshops and coordination with local water managers and growers and continue to integrate data from OpenET into farm and ranch management tools, as well as local water management accounting platforms and other tools.

Sustaining and advancing the underlying science is a critical component of this legislation and underscores the need for the federal government's participation in OpenET. A primary goal for OpenET going forward is to continually provide the best available science-based estimates of ET. This requires a team of researchers and programmers from across the government and working collaboratively to maintain and update the code as the science and underlying input data improves and as cloud computing and the Google Earth Engine platform evolve. We also expect ongoing computing and data charges and administrative and management needs associated with

initiating and maintaining contracts and coordinating efforts between OpenET's scientific community and its users. OpenET also anticipates the need to provide user support and the development of training resources for the OpenET user community.

H.R. 4832 is a wise investment that will build upon decades of investment by NASA, USGS, the National Oceanic and Atmospheric Administration (NOAA) and the European Space Agency (ESA) to develop, launch, and operate a constellation of Earth-observing satellites, and to establish the ground data systems required to capture, process, store, and distribute satellite data. All of the models in the OpenET ensemble leverage data from Landsat satellites to produce field-scale ET estimates, which is the primary satellite dataset used by the OpenET platform. However, multiple models implemented within the OpenET framework also integrate data from other satellites, including GOES, Sentinel-2, Suomi NPP, Terra, and Aqua, to produce ET data at a range of spatial and temporal scales.

Between the pending bipartisan Infrastructure Investment and Jobs Act and Build Back Better reconciliation framework, there are significant resources that will be provided to help address water challenges across the country that are exacerbated by a changing climate. Codifying an OpenET data program will ensure federal resources–through the likes of the Natural Resources Conservation Service's Environmental Quality Incentives Program (EQIP) and WaterSMART–get to the ground for climate resilience and water security benefits and ensure that funded projects comply with the statute to not increase irrigated acreage or consumptive use, respectively.

As mentioned earlier, OpenET data currently covers the 17 contiguous states in the West. The current OpenET consortium is working to expand OpenET into the rest of the country; but Congress authorizing–and appropriating funding for–OpenET will ensure that work is done far more quickly so that farmers, ranchers, foresters, and other water users across the country can benefit from its use, as well.

**Additional Expressions of Support for OpenET**

TU is happy to speak in support of OpenET and is proud to be here, today, to do so; but I would also like to highlight for the committee that there are many other water users and leaders who are supportive of OpenET. These expressions of support include:

"OpenET will be a valuable tool to estimate historical and current water consumed by crops across Nevada. OpenET data also will be especially useful for monitoring consumptive use to support local groundwater management plans that are needed in response to long-term groundwater level declines."
***—Adam Sullivan, P.E., Nevada Deputy State Engineer***

"In the West…there is a need for developing new monitoring technologies such as OpenET that provide more timely data availability and more refined spatial coverage. Currently access to satellite and ET data is limited and expensive, keeping it out of the hands of many water users and decision-makers. OpenET will allow water managers to assess how much water is being used via a cost-effective and easy-to-use web-based platform, filling a critical water data management gap."

***—Tony Willardson, Executive Director, Western States Water Council***

"The Harney Basin is running a groundwater deficit of 120,000 acre-feet to 130,000 acre-feet per year. We have used ET data to gain a better understanding of our water consumption and design more efficient irrigation systems that use about 15% less water. This could translate to a savings of 18% to 20% on electricity costs for pumping, too. With the demands on water from a growing population and feeding more people, we have to figure out how to get the best value from every drop of water. ET data is crucial to providing this information. "
***—Oregon State Rep. Mark Owens. Owens owns or manages 3,200 acres of farmland.***

"Reliable water data is almost as critical to farmers and water managers as the water supply itself. With added pressure from population growth and the uncertainty that climate change impacts have on existing and future water supply, OpenET allows planning for agricultural water needs in a way that just wasn't possible before."
***—E. Joaquin Esquivel, Chair of the California State Water Resources Control Board***

"Every five years, the Bureau of Reclamation is tasked with creating a report that summarizes water use and loss for the Upper Colorado River Basin states. Currently, there are several satellite-based methodologies to measure water, many of which will be incorporated into OpenET. Consequently, OpenET will serve as a valuable tool for us to test and compare ET measurement methodologies to determine the best approach for future studies."
***—James Prairie, Hydrologic Engineer, U.S. Department of Interior, Bureau of Reclamation***

"To comply with the new groundwater law in California, it's imperative to have accurate, transparent water use data to build a groundwater budget. But currently ET data can be very expensive to acquire from consultants or universities, and the methodologies are often inconsistent and unclear. Consequently, Rosedale turned to OpenET for accurate parcel-level ET water data at a lower cost to build an online accounting platform for our landowners to more easily manage their own groundwater budgets. Because the OpenET project has brought together a team of leading experts on several approaches for measuring ET, I'm confident it will become the de facto source of water data among landowners and water managers alike."
***—Eric Averett, General Manager, Rosedale-Rio Bravo Water Storage District (California)***

"OpenET represents a game-changing leap forward for water management in the West. OpenET will give water users in the Delta a much less expensive alternative method for complying with the state requirement to monitor and report on their water diversions. Instead of physically measuring every diversion in the Delta, farmers will be able to look up OpenET's estimate of their crop water use. If the estimate is acceptable to the farmer, the farmer knows that it will be acceptable to us. Concurring on OpenET's ensemble measurement will save time, money and confusion."
***—Michael George, Delta Watermaster (California)***

"OpenET is a great step forward for managing water needs in a time when demand far surpasses supply. Helping participating farmers and ranchers more effectively manage their water use not only helps their crop and bottom line, but creates opportunities for more water to remain in our river systems to benefit both people and nature."

***—Aaron Derwingson, Water Projects Director, Colorado River Program, The Nature Conservancy***

**OpenET Conclusion**

OpenET is filling a critical information gap and revolutionizing water management. Today, access to accurate, timely satellite-based data on the amount of water used to grow food is fragmented and often expensive, keeping it out of the hands of many farmers and decision-makers. By adopting H.R. 4832, Congress can ensure that farmers and water and land managers are able to develop more accurate water budgets and innovative management programs that promote adequate water supplies for agriculture, people and ecosystems.

## 2. H.R. 5345 *Saline Lakes Ecosystems in the Great Basin States Program Act of 2021*

TU and many others are appreciative of the work of Representatives Moore, Huffman, Lee, Thompson, Obernolte, and Costa to authorize a regional program to assess, monitor, and benefit the hydrology of saline lakes in the Great Basin through H.R. 5345, the Saline Lake Ecosystems in the Great Basin States Program Act. H.R. 5345 provides the U.S. Geological Survey, in coordination with the U.S. Fish and Wildlife Service and Tribal, state, academic, and nonprofit organizations, with resources to conduct scientific monitoring and assessments to develop a multiyear work and implementation plan to conserve saline lake ecosystems in the Great Basin.[1] This legislation advances the findings and recommendations of a broad group of stakeholders, from the Great Salt Lake Advisory Council's numerous studies and reports to the 2017 National Audubon Society report "Water and Birds in the Arid West: Habitats in Decline." This body of work shows that the need is urgent, that delay increases the costs of addressing the harms to human health and regional economies from exposed, dry lakebeds, and that improved understanding of the trends in water supply and water quality, habitat availability, and impacts on vulnerable migratory bird species is essential to support coordinated management of this irreplaceable network of saline lake habitats.[2] H.R. 5345 authorizes $5 million per year for fiscal years 2022 through 2027 to create this program.

Saline lake conservation is also trout conservation. Understanding the dynamics of freshwater flows and how these contributing freshwater rivers and streams connect with the saline lakes is critical to native fisheries conservation. The bill's hydrologic research will lead to better understanding of the river systems that feed these saline lakes. Potential solutions that deliver more water to saline lakes through the freshwater systems will benefit the important conservation and recreational values of these fisheries. If potential solutions include increasing river and streamflows in conjunction with agricultural or municipal water conservation, TU's relationships with producers and history of collaborative restoration efforts will provide insights on how to get these projects done on the ground in ways that maintain sustainable agricultural communities.

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[1] "U.S. House of Representatives Introduces Audubon-supported Saline Lake Ecosystems Bill," National Audubon Society, 23 September 2021, https://www.audubon.org/news/us-house-representatives-introduces-audubon-supported-saline-lake-ecosystems#:~:text=ooo%2Deek%20calls-,The%20Saline%20Lake%20Ecosystems%20in%20the%20Great%20Basin%20States%20Program,to%20establish%20effective%20management%20and; "Saline Lakes Ecosystems in the Great Basin," National Audubon Society, 7 May 2021.

[2] "Saline Lakes Ecosystems in the Great Basin," National Audubon Society, 7 May 2021.

**Saline Lakes in the Intermountain West**

In the arid West, saline lakes and their wetlands form an irreplaceable network of habitats that support millions of migrating shorebirds, waterbirds, and waterfowl throughout their annual travels. Saline lakes, or "terminal" lakes, often sit at the lowest elevation in the region in closed basins. Saline lakes are like small oceans in that they are fed by continuous freshwater sources and evaporation is the only outlet of water from these lakes, leading to an increase in salinity over centuries. Consequently, saline lakes have a concentration of salts and other dissolved minerals significantly higher than freshwater lakes. These lakes are fringed by a variety of wetlands from emergent marsh to playa and mudflats, all of which are part of the habitat mosaic essential to many bird species. Many saline lakes and their surrounding wetlands are located within the Great Basin states of Utah, Nevada, Oregon, and California and provide important economic, recreational, public health, and other community benefits.

Unfortunately, saline lakes are at risk now more than ever. Over the last century and a half, some of these important habitats have decreased in size by 50-95% due to diversions for agriculture, municipal, and industrial uses from rivers that provide inflows to these saline lakes.[3] For example, it is estimated that at Utah's Great Salt Lake, consumptive water uses have reduced river inflows by 39%, decreasing the lake volume by nearly half. In Nevada, Pyramid Lake has dropped more than 70 feet in elevation since 1890, and it is estimated that 84% of Lahontan Wetlands have been lost over the last 150 years. At Lake Abert in Oregon, reduced inflows substantially affect water levels, increasing salinity concentrations beyond tolerated levels, which limits production of food sources relied on by migratory birds. In 2014, Lake Abert declined to just 5% of its historic high. In California, Owens Lake has declined from 60,000 acres to under 26,000 acres, and Mono Lake water levels declined from 4.5 to 2.2 million acre-feet.[4]

The drying of these lake systems has myriad adverse effects for birds and other wildlife as well as neighboring communities. Declining inflows and the resulting falling lake levels disrupt ecosystems that support migratory birds and other wildlife; expose toxic, wind-borne dust that threatens the public health and economic vitality of communities in the region; negatively impact recreation; and ultimately threaten water security. These issues are only expected to worsen as climate change leads to increased temperatures and aridity, more frequent and severe droughts, and changes in precipitation patterns that exacerbate existing reductions of freshwater inflows to these saline lakes.[5]

**Great Salt Lake: A Declining Saline Lake**

As the largest saltwater lake in the Western Hemisphere, a key stopover in the Pacific Flyway for migratory birds, an important ecosystem for local fish and wildlife, and an economic driver for the Wasatch Front, Great Salt Lake in north-central Utah exemplifies the threats and opportunities for saline lakes in the arid West.[6] The lake is catastrophically low and getting

[3] Chad B. Wilsey, Lotem Taylor, Nicole Michel, and Karyn Stockdale, "Water and Birds in the Arid West: Habitats in Decline," National Audubon Society (New York, New York: 2017), 7; Wayne Wurtsbaugh, et al., "Impacts of Water Development on Great Salt Lake and the Wasatch Front," whitepaper, 24 February 2015, 2.
[4] Wilsey, et al., "Water and Birds in the Arid West," and references cited therein.
[5] Ibid., 7.
[6] Great Salt Lake Advisory Council (GSLAC), "Consequences of Drying Lake Systems around the World: Summary of the February 15, 2019 report prepared by AECOM for the Great Salt Lake Advisory Council," 2019,

lower: in July 2021, Great Salt Lake hit its lowest level since recordkeeping began and it has continued to decline in the months since, reflecting a 44% loss of surface area from historic average levels and resulting in the exposure of 750 acres of desiccated lakebed.[7]

The economic impacts of further declines in Great Salt Lake water levels are wide reaching and severe. A November 2019 report commissioned by the Great Salt Lake Advisory Council found that continued drying of the lake could result in economic losses between $1.69 billion to $2.17 billion per year as well as the loss of over 6,500 jobs. The report cited these losses as including "dust mitigation costs, health care costs from decreased air quality, disruption to Salt Lake City airport traffic due to increased dust storms, losses to the brine shrimp industry from increased salinity, reduced lake-effect snowpack, increased costs of treating invasive species such as phragmites, costs to mineral extraction at the Great Salt Lake due to water scarcity and declining Lake levels, and loss of Lake recreational spending." [8]

Dust storm at Owens Lake in March 2010. Photo by Brian Russell/Great Basin Unified Air Pollution Control District

Dust storms, such as the one pictured at Owens Lake in California which has become one of the largest sources of particulate matter in the United States due to the artificial desiccation of the lake, pose a major public health risk.[9] Exposure to airborne mineral dust causes increased incidences of asthma and other respiratory ailments and increased hospital visits for respiratory and cardiovascular diseases; the public health cost in the Great Salt Lake area is already estimated to be between $3.2 million to $13.6 million per year, and is expected to rise to between $6.6 million to $22.3 million per year if the lake continues to decline.[10] While dust mitigation measures that could help reduce public health risks are possible, they are expensive. At Owens Lake in California, dust abatement work is estimated to cost $3.6 billion by 2025, and Great Salt Lake is far larger than Owens Lake—19 times larger, in fact.[11] For these

https://static1.squarespace.com/static/5a46b200bff2007bcca6fcf4/t/6001c526b0b56c393b4bc0c0/1610728745439/Drying+Lake+Systems+-+Summary.pdf; Wilsey, et al., "Water and Birds in the Arid West," 35.

[7] "Record Low for Great Salt Lake," NASA Earth Observatory, 18 August 2021, https://earthobservatory.nasa.gov/images/148700/record-low-for-great-salt-lake.

[8] Martin & Nicholson and ECONorthwest, "Assessment of Potential Costs of Declining Water Levels in Great Salt Lake, Executive Summary," Prepared for the Great Salt Lake Advisory Council, revised November 2019, 1-4, https://documents.deq.utah.gov/water-quality/standards-technical-services/great-salt-lake-advisory-council/activities/DWQ-2019-012911.pdf.

[9] GSLAC, "Consequences of Drying Lake Systems around the World," 3. (text citation & photograph)

[10] Wurtsbaugh, et al., "Impacts of Water Development on Great Salt Lake and the Wasatch Front," 4; Martin & Nicholson and ECONorthwest, "Assessment of Potential Costs of Declining Water Levels in Great Salt Lake," 3.

[11] GSLAC, "Consequences of Drying Lake Systems around the World," 4.

reasons, among others, a recent *Salt Lake Tribune* article succinctly characterized the drying Great Salt Lake as "a ticking time bomb."[12]

Core industries in the Salt Lake City area would also be negatively affected if lake levels continue to drop. Brine shrimp in Great Salt Lake depend on microbialites, or reef-like structures created by microbes that act as the foundation for the lake's ecosystem, as their primary food source. Declining lake levels expose microbialites to the air, destroying brine shrimps' food source and causing a decrease in populations.[13] If harvesting declines or is forced to stop, the brine shrimp industry at Great Salt Lake could face annual losses of $40.1 million in direct output.[14]

In addition, the presence of such a large body of water close to the Wasatch Mountains produces the "lake effect," a contributing factor to Utah's annual snowpack and the region's famous dry, fluffy powder. While the lake effect provides only about 6% of annual snowfall to resorts in the Cottonwood Canyon area, which includes Alta, Snowbird, Brighton, and Solitude, this accounts for 30 to 40 inches per year of the snow that drives the area's ski industry. A shrinking Great Salt Lake also has implications for when the snowpack melts: dust carried from the dried-out lakebed settles on the snowpack where, because it is darker in color than the snow, it absorbs more heat and causes earlier melting by approximately 7 days in the spring. [15] These changes to snowpack could drive down visitation, resulting in a loss of recreation revenue in the range of $5.8 million to $9.6 million per year.[16]

While important to the ski industry, the loss of the lake effect would be detrimental to another key industry in the region: agriculture. The Tooele Valley south of Great Salt Lake receives an even larger percentage than the ski resorts of its annual snowfall from the lake effect, and reductions in annual precipitation could decrease agricultural output.[17] Agriculture also stands to suffer from declining lake levels due to dust, which coats plants and interferes with transpiration and photosynthesis, thereby causing reductions in yield and productivity.[18] Around the world, drying lakes have caused declines in agricultural output in places including the Aral Sea in Kazakhstan and Uzbekistan and Lake Urmia in Iran.[19]

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[12] Leia Larsen, "As Great Salt Lake shrivels and Salt Lake Valley's population swells, state regulators reveal what worries them most," *The Salt Lake Tribune*, 2 October 2021, https://www.sltrib.com/news/environment/2021/10/02/great-salt-lake-shrivels/.
[13] "Drought Negatively Impacting Great Salt Lake Microbialites and Ecosystem," Utah Department of Natural Resources, Utah Geological Survey, 15 July 2021, https://geology.utah.gov/drought-negatively-impacting-great-salt-lake-microbialites-and-ecosystem/.
[14] Martin & Nicholson and ECONorthwest, "Assessment of Potential Costs of Declining Water Levels in Great Salt Lake," 3.
[15] Julie Jag, "Will Utah's Snow Shrink along with the Great Salt Lake?" *The Salt Lake Tribune*, 4 August 2021, https://www.sltrib.com/sports/2021/08/04/will-utahs-snow-shrink/.
[16] Martin & Nicholson and ECONorthwest, "Assessment of Potential Costs of Declining Water Levels in Great Salt Lake," 3.
[17] Jag, "Will Utah's Snow Shrink along with the Great Salt Lake?"
[18] Martin & Nicholson and ECONorthwest, "Assessment of Potential Costs of Declining Water Levels in Great Salt Lake," 4.
[19] GSLAC, "Consequences of Drying Lake Systems around the World," 6.

Recreation associated with Great Salt Lake and its freshwater tributaries is also an important economic and cultural driver in the region. In association with Great Salt Lake, recreational activities include birding, hunting, sightseeing, sailing, and boating; these activities could see a potential 50% reduction due to declining water levels with estimated losses of $44.5 million in direct spending and 615 jobs.[20] The tributaries that provide Great Salt Lake with its freshwater inflows, such as the Bear, Weber, and Provo rivers, host world-class trout fishing waters. Utah's Central and Northern regions, which encompass the tributaries to Great Salt Lake are the most-fished waters in the state according to a 2016 survey.[21] In addition, the Provo River is the most-fished river in the state, with over 210,000 angler-days per year according to a 2012 survey; the Weber and Bear river watersheds are also significant recreational sites, with nearly 160,000 and over 85,000 angler-days respectively.[22] These data show the recreational importance of the wild and native river fisheries within the Great Salt Lake Basin.

**Ecosystem Connectivity: Saline Lakes & Freshwater Tributaries**

In Great Salt Lake and the entire network of saline lakes in the Great Basin, healthy freshwater ecosystems are inextricably tied to reversing declining lake levels. These lakes provide unique ecosystems that support a diversity of fish and wildlife year-round and are also integral to migratory birds on the Pacific and Central Flyways. The Intermountain West is the most important inland region for shorebirds in North America, supporting at least 11 breeding species, 23 migrant species, and millions of individuals. In this arid landscape, saline lakes and their associated wetlands provide essential habitat for waterbirds, shorebirds, and waterfowl.[23]

Saline lakes and associated wetlands in the Intermountain West create a habitat network integral to the Pacific Flyway that makes it possible for migratory birds to undertake their seasonal journeys. Due to their changing conditions and use by species, saline lakes and associated wetlands could be considered a single habitat network rather than independent units, and understanding connectivity within and among sites is essential for bird conservation.[24] Individual Great Basin lakes are important to migratory birds, but is the *totality* of the saline lakes network that is important for these species. Studying and understanding these lakes as a system essential to migratory birds will allow for effective protection of this resource and the development of creative solutions that benefit fish, wildlife, and human communities along with birds.

[20] Martin & Nicholson and ECONorthwest, "Assessment of Potential Costs of Declining Water Levels in Great Salt Lake," 3.
[21] R.J. Lilieholm, J.M. Keating, and R.S. Krannich, "2016 Utah Angler Periodic Survey: Project Summary Report," Utah Division of Wildlife Resources, November 2017, 36-37, https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1006&context=instream_all.
[22] R.S. Krannich, R.J. Lilieholm, and J. Unger, "2011-2012 Utah Angler Survey Project Summary Report," Utah Division of Wildlife Resources, November 2012, 48.
[23] Wilsey, et al., "Water and Birds in the Arid West," 28.
[24] Ibid., 36.

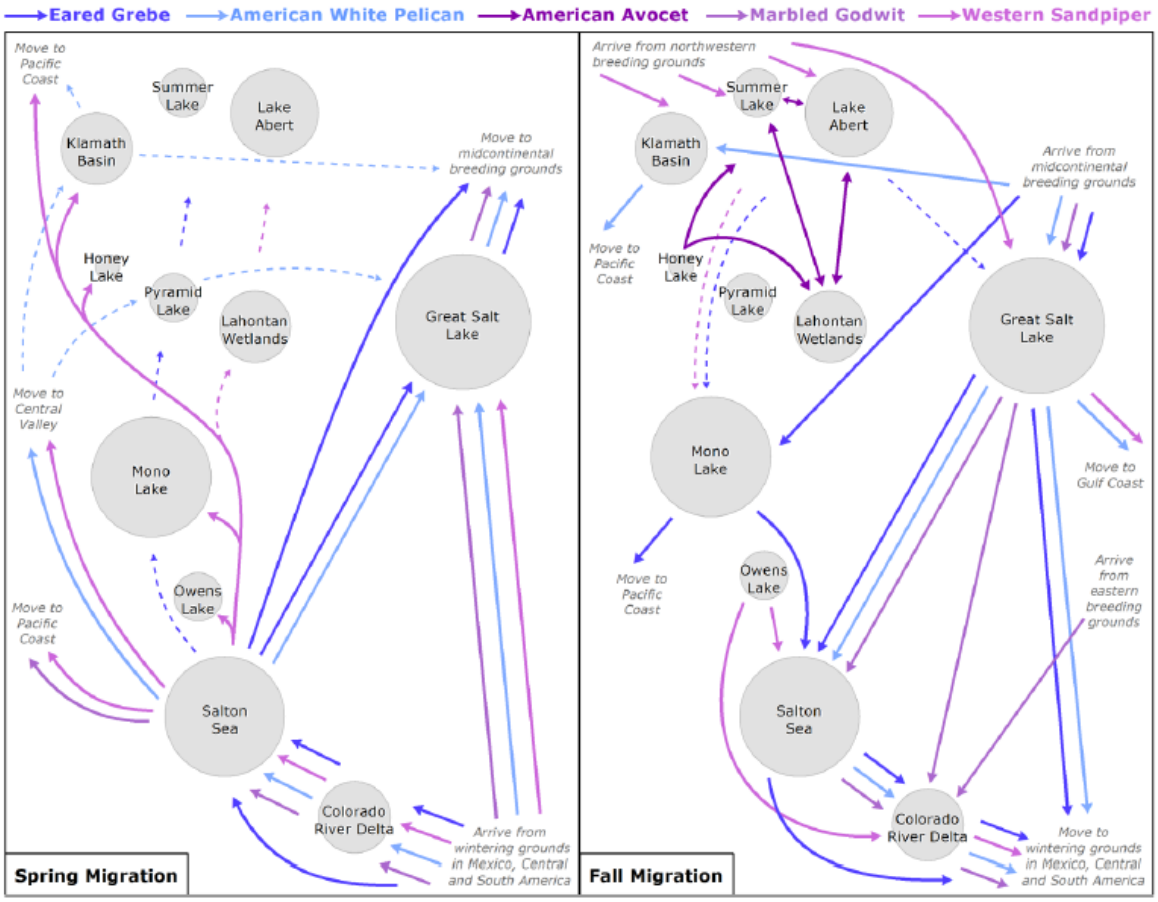


Figure 11. Generalized migration routes used by priority species during spring and fall. Waterbirds are depicted in blue and shorebirds in purple. Circle sizes scale to the maximum counts across priority species (Table 6). Routes are drawn based on expert opinion. Solid lines depict connectivity supported by empirical data, and dashed lines depict hypothesized connectivity. Individual species connectivity maps are available in Appendix B. [25]

Saline lakes depend on freshwater inflows from tributary rivers and streams to maintain healthy ecosystems and human communities. Improving watershed health and increasing flows in tributaries to saline lakes are integral components of restoring lake levels and ecosystem health in saline lakes. H.R. 5345 includes direction to synthesize data and information relating to water quantity, water quality, water use, and water demand; assessing these metrics for freshwater inflows to saline lakes will be important in understanding declining lake levels and finding effective solutions.

Trout Unlimited has a long history of working to improve habitat and increase flows in the Bear, Weber, and Provo rivers, key tributaries to Great Salt Lake. We and our partners have completed over 100 projects and invested well over $10 million in these three river basins to improve fish passage for Bonneville Cutthroat Trout, improve instream flows through three direct leasing projects, and improve irrigation efficiency to create instream benefits for wild trout. Our work to improve habitat and spawning and recruitment for Bonneville Cutthroat Trout has important insights for preserving the health and reversing the decline of Great Salt Lake.

[25] Ibid., 35.

Though the volume of flows is minimal, these projects provide important demonstrations of how voluntary, compensated water sharing agreements and flexible water management are integral components of any effective solution for reversing declining lake levels.[26] The study program authorized by H.R. 5345 aligns with TU's longstanding commitment and work to improve the health of the watersheds that sustain Great Salt Lake and others in the saline lakes network.

**H.R. 5345: A Foundation for Saline Lakes Conservation**

The USGS is uniquely positioned to undertake this program due to the agency's expertise in science-based hydrology monitoring programs, particularly its Integrated Water Availability Assessments work within the USGS Water Resources Mission Area, its extensive streamgage monitoring network, and its capacity for data synthesis. Providing the necessary water, habitat, and food at the right times and places for migratory birds across the network of saline lakes requires a regional approach, starting with integrated hydrologic and ecological monitoring and assessments to provide the technical basis for effective and coordinated management and conservation actions. The USGS will identify the science needs and develop an action plan for a multi-year program to monitor and assess Great Basin saline lake ecosystems and the wildlife that depend on them. The USGS's experience in interagency coordination and stakeholder engagement positions the agency to work closely with U.S. Fish and Wildlife Service and other federal, Tribal, state, and local governments, research universities, non-profit organizations, and other partners to develop a scientifically sound conservation plan with actionable recommendations for implementation. In addition, the Great Salt Lake Advisory Council has identified USGS as an important partner on its identified 12 strategies, which include measuring and retaining a right to conserved water, shepherding water, managing groundwater, expanding the authority to acquire water for the Great Salt Lake, and investing in agricultural water conservation.[27]

The multi-year program resulting from this legislation will build the scientific foundation needed to inform coordinated management and conservation actions for threatened Great Basin saline lake ecosystems, and the trout and birds that rely on the lakes and their freshwater tributaries. Future implementation of this conservation plan will require additional federal support, as well as working with local partners and stakeholders to identify and develop any new state authorities needed for effective implementation, if necessary, and to achieve the goals of the plan. The resulting conservation plan must have as its foundation sound science and data synthesis that supports and preserves the economic, cultural, and environmental importance of these saline lakes and tributary river systems to the West. Such a conservation plan will recognize that improving the health and flows of saline lake tributary rivers and streams is an important part of the planning and conservation effort. The goal of a healthy and hydrologically sound Great Salt Lake and other saline lakes will be met when its tributary rivers are also thriving. The conservation plan will also advance scientific understanding of fish and wildlife populations and habitat linkages across western landscapes through additional research, field study, and

[26] Ibid., 7.

[27] Great Salt Lake Advisory Council, "Water Strategies for Great Salt Lake: Executive Summary of Legal Analysis and Review of Select Water Strategies for Great Salt Lake," 2020, https://documents.deq.utah.gov/water-quality/standards-technical-services/great-salt-lake-advisory-council/activities/DWQ-2020-017443.pdf.

monitoring and use climate change and connectivity modeling to prioritize conservation and restoration.[28]

### 3. H. Res. 320 *Recognizing the critical importance of access to reliable, clean drinking water for Native Americans and Alaska Natives and confirming the responsibility of the Federal Government to ensure such water access* & H.R. 5001 *Upper Colorado and San Juan River Basins Recovery Act*

In addition to H.R. 4832 and H.R. 5345, TU also supports H. Res. 320 and H.R. 5001.

**H. Res. 320**

Trout Unlimited supports H. Res. 320, *Recognizing the critical importance of access to reliable, clean drinking water for Native Americans and Alaska Natives and confirming the responsibility of the Federal Government to ensure such water access*. When discussing western water issues, it is critical to include the necessity of addressing the ongoing lack of access to clean and safe drinking water for Native Americans. The need and obligation to ensure that all Tribal communities have clean water to drink cannot be overemphasized. We owe it to these Indigenous communities to provide the same level of basic service that most Americans take for granted.

The coronavirus pandemic has tragically highlighted the vast and long-standing inequities facing Tribal communities, including disparities in water access. According to the Centers for Disease Control and Prevention (CDC), American Indians and Alaska Natives are more likely than any other ethnic or racial group to be hospitalized or die from COVID.[29] Limited access to running water is one of the main factors contributing to this elevated rate of incidence.[30] According to the U.S. Water Alliance, Native American households are nineteen times more likely than white households to lack indoor plumbing.[31] Without a safe, reliable, affordable, and easily accessible water supply, these households are unable to meet basic personal hygiene, food preparation, domestic cleaning, and other needs required for good health. This lack of access reflects historical and persisting racial inequities that have resulted in health and socio-economic disparities.

Water in the West is a limited resource, and the unquantified water rights claims of federally recognized tribes negatively impact tribes, states, and communities across the West. Negotiated settlements of Indian water rights are a means of ensuring the reliability of water supplies for both Tribal and non-Tribal communities, through well-defined water rights, and provide the

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[28] Wilsey, et al., "Water and Birds in the Arid West," 8.

[29] "Risk for COVID-19 Infection, Hospitalization, and Death by Race/Ethnicity," Centers for Disease Control and Prevention, 9 September 2021, https://www.cdc.gov/coronavirus/2019-ncov/covid-data/investigations-discovery/hospitalization-death-by-race-ethnicity.html.

[30] Desi Rodriguez-Lonebear, et al., "American Indian Reservations and COVID-19: Correlates of Early Infection Rates in the Pandemic," *Journal of Public Health Management and Practice* 26, no. 4 (July/August 2020), 371-377, https://journals.lww.com/jphmp/fulltext/2020/07000/american_indian_reservations_and_covid_19_.14.aspx.

[31] "Closing the Water Access Gap in the United States: A National Action Plan," DigDeep Right to Water Project/U.S. Water Alliance, 2019.

certainty needed to help conserve water, address environmental needs, promote economic development, and create jobs on and off Tribal lands.

Many of these water rights settlements include infrastructure commitments that are vital to bringing clean drinking water to tribal communities and ensuring tribes have access to water needed for agriculture and economic development. Settlements also fulfill long-neglected federal trust and treaty obligations to Tribes, which until settled, expose taxpayers nation-wide to expensive litigation and possibly court decrees that may recognize tribal water rights, but may or may not provide Tribes with the resources to develop that water. The cost of meeting those trust and treaty obligations increases as time passes.

TU has collaborated with Tribes on several water right settlements, and we know from experience that water rights settlements may take a decade or more to finalize, due in part to the complex and significant issues typically involved in the adjudication or negotiated settlement of Indian water rights claims. TU recognizes that final adjudication or settlement of those claims is not, and should not be, a prerequisite to providing reliable, safe drinking water infrastructure to federally recognized Indian Tribes and Alaska Native communities under federal trust and treaty obligations. TU supports H. Res. 320 and the provision of clean water to Tribes to meet their domestic needs and recognizes that providing basic drinking water service is an essential component of the federal trust responsibility.

**H.R. 5001**

Trout Unlimited also supports H.R. 5001, the *Upper Colorado and San Juan River Basins Recovery Act*. This legislation is critically important to maintaining the momentum stakeholders in the Colorado River Basin have built towards species recovery.

The Colorado River is one of the most iconic rivers in the world. The region is home to a renowned wildlife community, including moose, elk, bighorn and desert sheep, river otters, and iconic bird species, as well 30 native fish species found nowhere else in the world. Biologists have identified more than 150 species that are at risk from water management operations. These species are struggling now, and climate change and drought are expected to exacerbate the impacts to these wildlife communities. The health of our environment and the species that depend on the river serve as proverbial “canaries in the coal mine.” If the health of the river system crashes, we will very likely experience negative impacts to our communities as well.

There are two important fish recovery programs in the Upper Colorado River Basin. These programs are working to recover four species of endangered Colorado River fish while still allowing water uses. The Upper Colorado River Endangered Fish Recovery Program and the San Juan River Basin Recovery Implementation Program (the “Programs”) are highly successful collaborative conservation partnerships involving the states of New Mexico, Colorado, Utah, and Wyoming, as well as Indian tribes, federal agencies, and water, power, and environmental interests. The Programs take a balanced approach to recovering four endangered fish species in the Upper Basin by implementing a range of basin-wide strategies, including improved management of federal dams and irrigation infrastructure, river and floodplain habitat improvement, fish stocking, and management of non-native fish species while still allowing water use and development in growing Western communities. Since 1988, the programs have

provided Endangered Species Act compliance without litigation for over 2,500 federal, tribal, state, and privately managed water projects across the Upper Colorado River basin. The programs are cost shared by the states, water users, and power customers.

H.R. 5001 makes necessary technical amendments to the programs to assure continuity in recovery program operations until longer-term reauthorization after 2023. TU supports passage of H.R. 5001 for the benefit of fish species and the health of the wildlife and human communities in the Colorado River Basin.

## 4. Conclusion

TU's experience in grappling with water security in the West over the last twenty years involves key federal elements to support successful efforts highlighted in the legislation under discussion today: using and advancing the best science, technology, and tools applied to water management; support for collaborative regional approaches to healthy ecosystems; recognizing the critical importance of Tribal drinking water access; and supporting collaborative conservation projects that protect endangered species.

TU appreciates the leadership of the sponsors of these bills, and the attention given by this Committee to western water issues. I thank you again for the opportunity to testify today.